

Fr. Conceicao Rodrigues College of Engineering

Department of Computer Engineering

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Class: T.E. (Computer B)

Subject Name: Computer network Lab

Subject Code : CSL 502

Experiment No:	1
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AIM: Use basic networking commands in Linux (ping, tracer, nslookup, netstat, ARP, RARP, ip, ifconfig, dig, route)

THEORY:

(Write the theory of commands you have studied and attach Screenshot of it)

1. Ifconfig (interface configuration) command is used to configure the kernel-resident network interfaces. It is used at the boot time to set up the interfaces as necessary. After that, it is usually used when needed during debugging or when you need system tuning. Also, this command is used to assign the IP address and netmask to an interface or to enable or disable a given interface.

```

student@lenovo804-ThinkCentre-M70e:~$ ifconfig
docker0  Link encap:Ethernet  HWaddr 02:42:cf:c7:15:71
          inet addr:172.17.0.1  Bcast:0.0.0.0  Mask:255.255.0.0
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

eth0     Link encap:Ethernet  HWaddr 44:37:e6:4d:df:1b
          inet addr:10.1.8.4  Bcast:10.255.255.255  Mask:255.0.0.0
          inet6 addr: fe80::4637:e6ff:fe4d:df1b/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:51944 errors:0 dropped:0 overruns:0 frame:0
          TX packets:18626 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:27621649 (27.6 MB)  TX bytes:2682227 (2.6 MB)
          Interrupt:17

lo       Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:2173 errors:0 dropped:0 overruns:0 frame:0
          TX packets:2173 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:193433 (193.4 KB)  TX bytes:193433 (193.4 KB)

student@lenovo804-ThinkCentre-M70e:~$

```

2. NSLOOKUP

Nslookup (stands for “Name Server Lookup”) is a useful command for getting information from DNS server. It is a network administration tool for querying the Domain Name System (DNS) to obtain domain name or IP address mapping or any other specific DNS record. It is also used to troubleshoot DNS related problems.

```

student@lenovo804-ThinkCentre-M70e: ~
student@lenovo804-ThinkCentre-M70e:~$ nslookup www.atharvacoe.ac.in
Server:          127.0.1.1
Address:         127.0.1.1#53

```

3. Ping

PING (Packet Internet Groper) command is used to check the network connectivity between host and server/host. This command takes as input the IP address or the URL and sends a data packet to the specified address with the message “PING” and get a response from the server/host this time is recorded which is called latency. Fast ping low latency means faster connection. Ping uses ICMP(Internet Control Message Protocol) to send an ICMP echo message to the specified host if that host is available then it sends ICMP reply message. Ping is generally measured in millisecond every modern operating system has this ping pre-installed.

```
student@lenovo804-ThinkCentre-M70e: ~  
student@lenovo804-ThinkCentre-M70e:~$ ping -c 4 10.1.8.3  
PING 10.1.8.3 (10.1.8.3) 56(84) bytes of data.  
64 bytes from 10.1.8.3: icmp_seq=1 ttl=64 time=0.324 ms  
64 bytes from 10.1.8.3: icmp_seq=2 ttl=64 time=0.333 ms  
64 bytes from 10.1.8.3: icmp_seq=3 ttl=64 time=0.316 ms  
64 bytes from 10.1.8.3: icmp_seq=4 ttl=64 time=0.302 ms  
  
--- 10.1.8.3 ping statistics ---  
4 packets transmitted, 4 received, 0% packet loss, time 3000ms  
rtt min/avg/max/mdev = 0.302/0.318/0.333/0.024 ms  
student@lenovo804-ThinkCentre-M70e:~$
```

4. TRACEPATH

tracepath command in Linux prints the route that a packet takes to reach the host. This command is useful when you want to know about the path and about all the hops that a packet takes. Below image depicts how traceroute command is used to reach the Google(172.217.26.206) host from the local machine and it also prints detail about all the hops that it visits in between.

```
student@lenovo804-ThinkCentre-M70e:~$ traceroute  
Usage:  
  traceroute [-4dFItrreAUDV] [-f first_ttl] [-g gate,...] [-i device] [-m max_ttl] [-N queries] [-p port] [-t tos] [-l flow_label] [-w waittime] [-q nqueries] [-s src_addr] [-z sendwait] [-r]  
  -f mark=num ] host [ packetlen ]  
Options:  
  -4                Use IPv4  
  -6                Use IPv6  
  -d --debug        Enable socket level debugging  
  -F --dont-fragment Do not fragment packets  
  -f first_ttl      --first=first_ttl  
                      Start from the first ttl hop (instead from 1)  
  -g gate,...      --gateway=gate,...  
                      Route packets through the specified gateway  
                      (maximum 8 for IPv4 and 127 for IPv6)  
  -I --icmp         Use ICMP ECHO for tracerouting  
  -T --tcp         Use TCP SYN for tracerouting (default port is 80)  
  -i device        --interface=device  
                      Specify a network interface to operate with  
  -m max_ttl      --max-hops=max_ttl  
                      Set the max number of hops (max TTL to be  
                      reached). Default is 30  
  -N queries       --sin-queries=queries  
                      Set the number of probes to be tried  
                      simultaneously (default is 10)  
  -n              Do not resolve IP addresses to their domain names  
  -p port         --port=port  
                      Set the destination port to use. It is either  
                      initial udp port value for "default" method  
                      (incremented by each probe, default is 33434), or  
                      initial seq for "icmp" (incremented as well,  
                      default from 1), or some constant destination  
                      port for other methods (with default of 80 for  
                      "tcp", 53 for "udp", etc.)  
  -t tos          --tos=tos  
                      Set the TOS (IPv4 type of service) or TC (IPv6  
                      traffic class) value for outgoing packets  
  -l flow_label    --flowlabel=flow_label  
                      Use specified flow_label for IPv6 packets  
  -w waittime     --wait=waittime  
                      Set the number of seconds to wait for response to  
                      a probe (default is 5.0). Non-integer (float  
                      point) values allowed too  
  -q nqueries     --queries=nqueries  
                      Set the number of probes per each hop. Default is  
                      3  
  -r              Bypass the normal routing and send directly to a  
                      host on an attached network  
  -s src_addr     --source=src_addr  
                      Use source src_addr for outgoing packets  
  -z sendwait     --sendwait=sendwait  
                      Minimal time interval between probes (default 0).  
                      If the value is more than 10, then it specifies a  
                      number in milliseconds, else it is a number of  
                      seconds (float point values allowed too)  
  -e --extensions Show ICMP extensions (if present), including MPLS  
  -A --as-path-lookups Perform AS path lookups in routing registries and  
                      print results directly after the corresponding  
                      addresses  
  -M name         --module=name  
                      Use specified module (either builtin or external)
```

5. Netstat

Netstat command displays various network related information such as network connections, routing tables, interface statistics, masquerade connections, multicast memberships etc.,

```
student@lenovo804-ThinkCentre-M70e: ~
student@lenovo804-ThinkCentre-M70e:~$ netstat -a
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 lenovo804-ThinkC:domain *:                        LISTEN
tcp        0      0 localhost:ipp           *:                        LISTEN
tcp        0      0 10.1.8.4:40190          bom05s11-in-f2.1e:https TIME_WAIT
tcp        0      0 10.1.8.4:52797          151.101.2.114:https    TIME_WAIT
tcp        0      0 10.1.8.4:38575          bom05s15-in-f14.1:https ESTABLISHED
tcp        0      0 10.1.8.4:38576          bom05s15-in-f14.1:https ESTABLISHED
tcp        0      0 10.1.8.4:52065          bom05s15-in-f4.1e:https TIME_WAIT
tcp        0      0 10.1.8.4:52796          151.101.2.114:https    TIME_WAIT
tcp        0      0 10.1.8.4:40191          bom05s11-in-f2.1e:https TIME_WAIT
tcp        0      0 10.1.8.4:38634          bom05s15-in-f14.1:https ESTABLISHED
tcp        0      0 10.1.8.4:38637          bom05s15-in-f14.1:https TIME_WAIT
tcp        0      0 10.1.8.4:38573          bom05s15-in-f14.1:https ESTABLISHED
tcp        0      0 10.1.8.4:37409          server-52-222-135:https TIME_WAIT
tcp        0      0 10.1.8.4:41299          a184-30-54-102.de:https TIME_WAIT
```

6. ARP

The command **arp** stands for **Address Resolution Protocol**. It allows us to view or add content into kernel's ARP table.

```
student@lenovo804-ThinkCentre-M70e: ~
student@lenovo804-ThinkCentre-M70e:~$ arp -v
Address              HWtype  HWaddress              Flags Mask            Iface
10.8.1.3              ether   (incomplete)          C                     eth0
10.0.0.3              ether   08:35:71:f0:35:c0     C                     eth0
10.1.8.3              ether   44:37:e6:4d:e0:f7     C                     eth0
Entries: 3           Skipped: 0           Found: 3
student@lenovo804-ThinkCentre-M70e:~$
```

7. **IPip** command in Linux is present in the **net-tools** which is used for performing several network administration tasks. **IP** stands for **Internet Protocol**. This command is used to show or manipulate routing, devices, and tunnels. It is similar to **ifconfig** command but it is much more powerful with more functions and facilities attached to it. **ifconfig** is one of the deprecated commands in the **net-tools** of Linux that has not been maintained for many years. **ip** command is used to perform several tasks like assigning an address to a network interface or configuring network interface parameters.

It can perform several other tasks like configuring and modifying the default and static routing, setting up tunnel over IP, listing IP addresses and property information, modifying the status of the interface, assigning, deleting and setting up IP addresses and routes.


```

student@lenovo804-ThinkCentre-M70e: ~
student@lenovo804-ThinkCentre-M70e:~$ ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 44:37:e6:4d:df:1b brd ff:ff:ff:ff:ff:ff
    inet 10.1.8.4/8 brd 10.255.255.255 scope global eth0
        valid_lft forever preferred_lft forever
    inet6 fe80::4637:e6ff:fe4d:df1b/64 scope link
        valid_lft forever preferred_lft forever
3: docker0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue state DOWN group default
    link/ether 02:42:cf:c7:15:71 brd ff:ff:ff:ff:ff:ff
    inet 172.17.0.1/16 scope global docker0
        valid_lft forever preferred_lft forever
student@lenovo804-ThinkCentre-M70e:~$

```

8.DIG dig command stands for Domain Information Groper. It is used for retrieving information about DNS name servers. It is basically used by network administrators. It is used for verifying and troubleshooting DNS problems and to perform DNS lookups. Dig command replaces older tools such as nslookup and the host.

```

student@lenovo804-ThinkCentre-M70e: ~
student@lenovo804-ThinkCentre-M70e:~$ dig atharvacoe.ac.in

; <<>> DiG 9.9.5-4.3-Ubuntu <<>> atharvacoe.ac.in
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 44951
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;atharvacoe.ac.in.                IN      A

;; ANSWER SECTION:
atharvacoe.ac.in.                14399   IN      A      192.185.180.65

;; Query time: 479 msec
;; SERVER: 127.0.1.1#53(127.0.1.1)
;; WHEN: Thu Aug 30 13:58:05 IST 2018
;; MSG SIZE rcvd: 50

student@lenovo804-ThinkCentre-M70e:~$

```

CONCLUSION: Hence, in this experiment, we have successfully studied some important networking command and also implemented them in Linux